To: Phil Goodwin, Jim Odom
From: Dave Sheppard
Re: Summary of Changes from FREE PL PCB to FREE Flight PCBs
Date: November 21, 2003

This past week, the FREE card Comprehensive Performance Test and FREE card Thermal Test were both completed on FREE Prototype Left Board 1-01-1. With testing complete, we are now ready to proceed to the FREE flight boards with the following changes.

1. We will remove the GARC2 Fix Circuit. This is due to the conclusion of a successful functional test of the GARCV3 ASICs. The GARC2 Fix Circuit was incorporated on the PL board in the event that we would need to fly GARCV2. This circuit was to mitigate a specific power up condition for the Look-at-Me circuitry present in GARCV2. This was one update to GARCV3 that has removed the necessity for this circuit. This was schematic page 31 in the document "FREE Prototype Left Board Schematics.pdf". Components removed from the flight board (vs. PL) by this change are:

   CF1, CF2, CF3, gates UR1C-UR1E, UF1, UF2, UF3, COS1, R86, D2 R1070, RLT7, RLT8, R1066, R1067, R1068, R1069 (11-5-03)

2. R82 is changed from a pull-up resistor to a pull-down resistor. (11-5-03)

3. Tie unused inverter inputs **UR1-3,5,9,11** to Vdd. These inputs were now unused with the removal of the GARC2 Fix circuit. (11-21-03)

4. Thermistors **RTH1** and **RTH2** part numbers updated to the flight part number, 311P18-10S7R6 (11-5-03)

5. Add capacitor across input to common mode choke, **CP10**, as per ACD electronics peer review RFAs #3 and #5, Grounding and Power Supply Filtering. (11-5-03).

6. Add capacitors **CP11, CP12** from ACD power return to chassis tie points **TCH1, TCH2**, as per ACD electronics peer review RFAs #3 and #5, Grounding and Power Supply Filtering. The chassis connection will be via wire to these points. (11-5-03)

7. Add capacitor **CR3** to reset circuit to extend the length of the reset pulse to greater than 100 milliseconds as per design review.

8. Added **RGD2** to provide redundancy (i.e., parallel with **RGD1**) on the HVBS enable pulse reference as suggested by Jim Odom (11-5-03). This redundancy is additionally in response to changes incorporated as a result of Peer Review RFA #1, HVBS grounding.

9. Add 10KΩ pullup to ACD_CLKP and 2KΩ pulldown to ACD_CLKM on primary and redundant clock inputs. These are resistors **RLT11, RLT9, RLT12, and RLT10** respectively (11-5-03).

Here is a part-by-part summary of changes as generated by PADS ECO for the transition from FREE Prototype Left to FREE Flight boards:

PADS-ECO-V3.0-MILS
REMARK old file: C:\padspwr\Files\ecogtmp0.asc
REMARK new file: C:\padspwr\Files\GLAST\FREE\FREELEFTBOARD\FLIGHTFREELEFT\FREE110503.ASC
REMARK created by ECOGEN (Version 6.0g) on 11/6/2003 12:19:35 PM

DELPIN

R1066.1 AEM_CLK_AP	Deleted – see item (1)
R1067.1 AEM_NSCMD_AP	Deleted – see item (1)
R1067.2 ACD_NSCMD_AP	Deleted – see item (1)
R1068.2 ACD_CLK_AM	Deleted – see item (1)
R1069.1 AEM_NSCMD_AM	Deleted – see item (1)
R1069.2 ACD_NSCMD_AM	Deleted – see item (1)
R1070.1 AEM_CMD	Deleted – see item (1)
R1070.2 VDD	Deleted – see item (1)
R82.2 VCC	Changed – see item (2)
R86.1 N31826	Deleted – see item (1)
R86.2 OSC_1	Deleted – see item (1)
RLT4.1 AEM_CLK_AP	Reassigned – see item (1)
RLT4.2 AEM_CLK_AM	Reassigned – see item (1)
RLT5.1 AEM_NSCMD_AP	Reassigned – see item (1)
RLT5.2 AEM_NSCMD_AM	Reassigned – see item (1)
CF1.1 VDD	Deleted – see item (1)
CF1.2 GND_ANALOG	Deleted – see item (1)
CF2.1 VDD	Deleted – see item (1)
CF2.2 GND_ANALOG	Deleted – see item (1)
CF3.1 VDD	Deleted – see item (1)
CF3.2 GND_ANALOG	Deleted – see item (1)
COS1.1 N31826	Deleted – see item (1)
COS1.2 INT_OSC	Deleted – see item (1)
D2.A NDAC_CLR	Deleted – see item (1)
D2.C N31826	Deleted – see item (1)
JP1.76 AEM_NSCMD_AM	Reassigned – see item (1)
JP1.77 AEM_NSCMD_AP	Reassigned – see item (1)
JP1.79 AEM_CLK_AP	Reassigned – see item (1)
UF3.1 N268044	Deleted – see item (1)
UF3.10 ACD_A_CLK	Deleted – see item (1)
UF3.11 N268522	Deleted – see item (1)
UF3.12 N268522	Deleted – see item (1)
UF3.13 AEM_A_CMD	Deleted – see item (1)
UF3.14 VDD	Deleted – see item (1)
UF3.2 INT_OSC	Deleted – see item (1)
UF3.3 NDAC_CLR	Deleted – see item (1)
UF3.4 N267934	Deleted – see item (1)
UF3.5 AEM_CLK	Deleted – see item (1)
UF3.6 DISABLE_N	Deleted – see item (1)
UF3.7 GND_ANALOG	Deleted – see item (1)
UF3.8 N268044	Deleted – see item (1)
UF3.9 N267934	Deleted – see item (1)
UR1.10 N268522	Deleted – see item (1)
UR1.11 AEM_CMD	Deleted – see item (1,3)
UR1.3 NDAC_CLR	Deleted – see item (1,3)
UR1.4 DISABLE_N	Deleted – see item (1)
UR1.5 N31826	Deleted – see item (1,3)
UR1.6 OSC_1	Deleted – see item (1)
UR1.8 INT_OSC	Deleted – see item (1)
UR1.9 OSC_1	Deleted – see item (1,3)
UF2.1 ACD_A_CLK	Deleted – see item (1)
UF2.12 GND_ANALOG	Deleted – see item (1)
UF2.15 GND_ANALOG	Deleted – see item (1)

UF2.16 VDD	Deleted – see item (1)
UF2.2 ACD_CLK_AP	Deleted – see item (1)
UF2.3 ACD_CLK_AM	Deleted – see item (1)
UF2.4 VDD	Deleted – see item (1)
UF2.5 ACD_NSCMD_AM	Deleted – see item (1)
UF2.6 ACD_NSCMD_AP	Deleted – see item (1)
UF2.7 AEM_A_CMD	Deleted – see item (1)
UF2.8 GND_ANALOG	Deleted – see item (1)
UF2.9 GND_ANALOG	Deleted – see item (1)
UF1.1 AEM_CLK_AM	Deleted – see item (1)
UF1.12 GND_ANALOG	Deleted – see item (1)
UF1.16 VDD	Deleted – see item (1)
UF1.2 AEM_CLK_AP	Deleted – see item (1)
UF1.3 AEM_CLK	Deleted – see item (1)
UF1.4 VDD	Deleted – see item (1)
UF1.5 AEM_CMD	Deleted – see item (1)
UF1.6 AEM_NSCMD_AP	Deleted – see item (1)
UF1.7 AEM_NSCMD_AM	Deleted – see item (1)
UF1.8 GND_ANALOG	Deleted – see item (1)
DELPART	
R1067 0805MIL	Deleted – see item (1)
R1069 0805MIL	Deleted – see item (1)
R1070 0805MIL	Deleted – see item (1)
R86 0805MIL	Deleted – see item (1)
RLT5 0805MIL	Deleted – see item (1), PADS software part reference designator reuse
CF1 CDR31	Deleted – see item (1)
CF2 CDR31	Deleted – see item (1)
CF3 CDR31	Deleted – see item (1)
COS1 CDR31	Deleted – see item (1)
D2 DO-35	Deleted – see item (1)
UF3 HCS02MS	Deleted – see item (1)
UF2 UT54LVDS031LV	Deleted – see item (1)
UF1 UT54LVDS032LV	Deleted – see item (1)
CHGPART	
RTH1 311-P-18-09S7R6 311P18-10S7R6	Updated, item (4)
RTH2 311-P-18-09S7R6 311P18-10S7R6	Updated, item (4)
RENPART	
R1066 RLT11	PADS software part reference designator reuse; added see item (9)
R1068 RLT12	PADS software part reference designator reuse; added see item (9)
RLT4 RLT9	PADS software part reference designator reuse; added see item (9)
RLT7 RLT4	PADS software part reference designator reuse
RLT8 RLT5	PADS software part reference designator reuse
PART	
RGD2 0805MIL	Added as per Item (8)
RLT10 0805MIL	Added as per Item (9)
CP10 CDR35	Added as per Item (5)
CP11 CDR35	Added as per Item (6)
CP12 CDR35	Added as per Item (6)
CR3 CDR35	Added as per Item (7)
TCH1 TP	Added as per Item (6)
TCH2 TP	Added as per Item (6)
JOINNET	
AEM_CLK_AM ACD_CLK_AM	As per item (1)
NET	
SIGNAL ACD_28V_RTN_P	As per item (8)
RGD2.1	
SIGNAL ACD_CLK_AP	As per item (1)
JP1.79	

SIGNAL ACD_CLK_BM As per item (1)
RLT10.1
SIGNAL ACD_CLK_BP As per item (1)
RLT9.2
SIGNAL ACD_NSCMD_AM As per item (1)
JP1.76
SIGNAL ACD_NSCMD_AP As per item (1)
JP1.77
SIGNAL GND_ANALOG As per item (2)
R82.2 CR3.2
SIGNAL N68149 As per item (6)
TCH1.1 TCH2.1 CP12.2 CP11.2
SIGNAL RST_RC As per item (7)
CR3.1
SIGNAL RTN_S As per items (6, 8, 9)
CP12.1 CP11.1 RGD2.2 CP10.2 RLT10.2 RLT12.2
SIGNAL VDD_S As per items (6, 9)
CP10.1 RLT9.1 RLT11.1

REMARK Deleted pins: 72, Added pins: 22
END

*** Note change Item (3) does not appear in this ECO list. It appears in the 11-21-03 netlist.